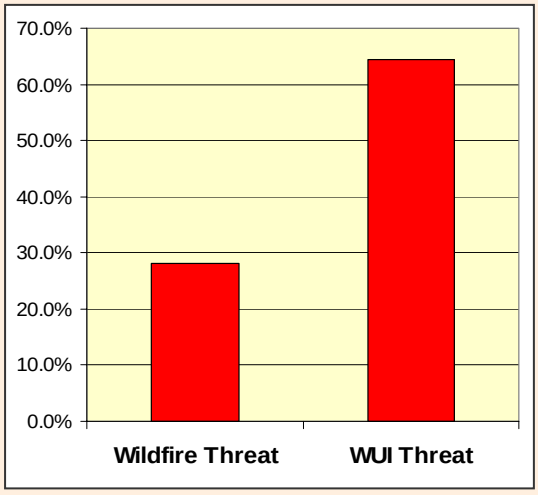
Wildfires and Residential Development – Risk Management and Public Policy Opportunities

Wildfires are a continuing threat to the Bay Area residential areas.

During the past 50 years, the Bay Area has experienced wildfire disasters in 1961, 1962, 1964, 1965, 1970, 1981, 1985, 1988, and 1991. By far the most damaging was the 1991 fire in the East Bay Hills, which resulted in $1.7 billion in losses. In that fire, 3,354 family dwellings and 456 apartments were destroyed, while 25 people were killed and 150 people were injured.

While it is unlikely that any single fire disaster in the Bay Area would exceed the 1991 East Bay Hills Fire in total losses, wildfires remains a pervasive and continuing concern. The California Department of Forestry maps wildfire hazard in two ways – wildland-urban-interface (**WUI**) fire threat for areas where local fire agencies have jurisdiction, and wildfire threat for areas that the State has jurisdiction. Based on an analysis of data on wildfires during the past 50 years, 27% of the areas mapped as an extreme wildfire threat have burned, 23% of those mapped as very high, and 14% of those mapped as high. In addition, 4.3% of the areas in **WUI** fire threat areas have burned.

Figure – Percentage of New Residential Development in Wildfire Hazard Areas



While **18.5%** of the region's land is in a WUI fire threat area, **64.4%** of the residential land newly developed or redeveloped from 2000-2005 is in these areas.

The 2005 estimated market value of **residential buildings alone** in high-to-extreme wildfire threat areas is $54 billion, while the value of these buildings in WUI areas is $472 billion.

Ways to improve fire resistance in wildfire hazard areas.

While the best solution would be to completely avoid building in wildfire hazard areas, this is not practical in urban areas.

Building codes and fire codes can lessen the potential threat of wildfires, but cannot eliminate the threat of damage. No building is fire "proof." In addition, existing homes will remain threatened without proper mitigation.

Local governments need to develop strong local regulations and programs for homes in wildfire hazard areas if the threat of devastating fires is to be reduced.

The following three pages list some of the types of regulations and policy strategies that local governments can use to mitigate the increased hazard exposure associated with building in areas subject to wildfires. Since housing is the most common new urban use in wildfire hazard areas, these strategies focus on mitigation of wildfire threat to residential uses. The strategies are grouped into seven general categories:

- Land use regulations;
- Vegetation management programs;
- Public education and outreach efforts;
- Building regulations for new and existing development;
- Increased enforcement of codes;
- Emergency response activities; and
- Strategies geared toward reducing structural fires resulting from earthquakes.

Many more strategies are available for each of these areas, particularly related to public education, emergency access, and emergency response. For a comprehensive list of these and other regulations and policies for hazard mitigation, see **http://quake.abag.ca.gov/mitigation/.**

Land Use Regulations –

Hillside development can be problematic due to potential hazards of wildfire, as well as of landsliding and erosion. The pressure to convert hillside areas to urban uses is great, however, in inner suburban communities (such those bordering the East Bay Hills). The following ways to mitigate these risks are available to local governments.

1) Establish a managed buffer zone between residential properties and landslide or wildfire hazard areas.
2) Discourage, add additional mitigation strategies for, or prevent construction on slopes greater than a set percentage, such as 15%, due to landslide or wildfire hazard concerns.
3) Review development proposals to ensure that they incorporate required and appropriate fire-mitigation measures, including adequate provisions for occupant evacuation **and access by emergency response personnel and equipment.**
4) Develop a clear regulatory framework to manage the wildland-urban-interface consistent with ***Fire Wise*** and sustainable community principles.

Local Hazard Mitigation Plan (LHMP) Policy Number

Example of inadequate access

LAND-e-1

LAND-e-2

LAND-b-1

LAND-b-2

See www.firesafecouncil.org and www.firewise.org for more information on fire safety and sustainable community principles.

Regulations of Housing Construction –

Local governments have a variety of options for regulating construction of new homes. These regulations are among the simplest to institute because they can become requirements of the environmental review process.

1) Require that new homes in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat be constructed of fire-resistant building materials (including roofing and exterior walls) and incorporate fire-resistant design features to increase structural survivability and reduce ignitability. **Note** - See *Structural Fire Prevention Field Guide for Mitigation of Wildfires* at http://osfm.fire.ca.gov/structural.html.
2) Adopt and/or amend, as needed, updated versions of the *California Building and Fire Codes* so that optimal fire-protection standards are used in construction and renovation projects.
3) Require fire sprinklers in new homes located more than 1.5 miles or a 5-minute response time from a fire station or in an identified high hazard wildland-urban-interface wildfire area.
4) Require fire sprinklers in all new or substantially remodeled multifamily housing, regardless of distance from a fire station.
5) Require fire sprinklers in all mixed use development to protect residential areas from fires started in non-residential areas.

Build or re-roof homes with noncombustible roofing materials. Roof eaves should be boxed or enclosed with fire resistive materials.

HSNG-g-3

Other examples of fire-resistant design features include: (1) minimal use of eaves, internal corners, and open first floors; (2) installation of screens on chimneys and stovepipes; and (3) ensuring any decks and porches are enclosed and built of fire resistant materials.

HSNG-g-6

HSNG-g-14

HSNG-g-15

HSNG-g-16

Vegetation Management Strategies –

Wildland fires have as much to do with controlling vegetation fuel on private and public lands as with the construction of housing. The following three strategies focus on fuel reduction.

1) Expand vegetation management programs in WUI fire-threatened communities or in areas exposed to high-to-extreme fire threat to more effectively manage the fuel load through roadside collection and chipping, mechanical fuel reduction equipment, selected harvesting, use of goats or other organic methods of fuel reduction, and selected use of controlled burning.
2) Establish a *Fire Hazard Abatement District* to fund reduction in fire risk of existing properties through vegetation management that includes reduction of fuel loads, use of defensible space, and development of fuel breaks.
3) Ensure that fire-preventive vegetation-management techniques and practices for creek sides and high-slope areas do not contribute to the landslide and erosion hazard.

Fuel management is a continuing process. Thus, it is important to provide consistent follow-up to manage fuel loads beyond initial vegetation-management treatments.

LHMP Policy Number

HSNG-g-9

Roadside clearance using a Tiger Mower in the Oakland Wildfire Prevention District

HSNG-g-12

HSNG-g-19

On-going vegetation management needs to have an established long-term funding mechanism such as provided by *Fire Hazard Abatement Districts*. In addition, residents need to understand the concept of defensible space to cooperate in these efforts.

Public Education Strategies –

Public outreach and education programs are critical in hazard mitigation. They involve government agencies and private property owners within a community working together to create areas of defensible space and promote fire safety. Many of these programs are common among a variety of hazards and are listed in http://quake.abag.ca.gov/mitigation/strategies.html under HSNG-k-1 to HSNG-k-17. The following strategies focus on the wildfire threat.

1) Increase efforts to reduce hazards in existing development by working with residents to improve home design and retrofit, as well as on vegetation management and defensible space mitigation strategies.
2) Tie public education on defensible space and a comprehensive defensible space ordinance to a field program of enforcement.
3) Develop financial incentives for homeowners to be "model" defensible space homes in neighborhoods that are wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.
4) Promote the installation of early warning fire alarm systems in homes in WUI fire-threatened communities or in areas exposed to high-to-extreme fire threat connected to fire department communication systems.

Use of goats for vegetation management by a homeowner

HSNG-g-1

HSNG-g-3

HSNG-g-4

HSNG-g-10

Enforcement Strategies –

Regulations are only as effective as their enforcement mechanisms.	LHMP Policy Number
1) Create a mechanism to enforce provisions of the *California Building and Fire Codes* and local housing codes that require the installation of smoke detectors and/or fire-extinguishing systems by making installation a condition of (a) finalizing a permit for any work on existing properties valued at over a fixed amount, such as $500 or $1000, and/or (b) a condition for the transfer of property if these changes are determined cost-effective strategies.	HSNG-g-7 HSNG-g-17
2) Compile a list of high-rise and high-occupancy buildings which are deemed, due to their age or construction materials, to be particularly susceptible to fire hazards, and determine an expeditious timeline for the fire-safety inspection of all such structures.	
3) Conduct periodic fire-safety inspections of all multifamily buildings, as required by State law.	HSNG-g-18

Emergency Response Strategies –

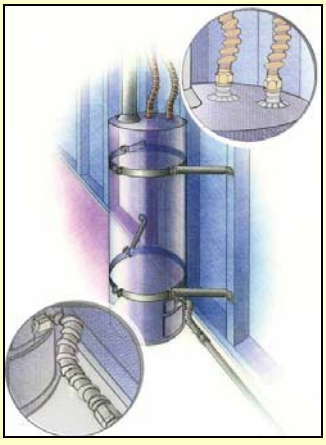
While improving emergency response in all areas is a worthwhile goal, the following three strategies focus on emergency response capabilities in wildfire hazard areas.	LHMP Policy Number
1) Consider fire safety, evacuation, and emergency vehicle access when reviewing proposals to add secondary units or additional residential units in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.	HSNG-g-5
2) Work to ensure a reliable source of water for fire suppression in rural-residential areas through the cooperative efforts of water districts, fire districts, and residents.	HSNG-g-8
3) Work with residents in rural-residential areas to ensure adequate access and evacuation in WUI fire-threatened communities or in areas exposed to high-to-extreme fire threat.	HSNG-g-12
Working to ensure that vehicles are not parked in areas that block access routes can be accomplished through increased enforcement and through public education.	

Extra Strategies Geared Toward Reducing Structural Fires in Earthquakes –

LHMP Policy Numbers HSNG-g-19 and HSNG-g-20

Structural and wildland fires can be triggered by damage caused in an earthquake. These fires are of particular concern because they will come at a time when emergency response capabilities are reduced, roads are damaged and closed, and water supply is disrupted. Two ways to mitigate these risks available to local governments are:

1) Create a mechanism to require the bracing of water heaters and flexible couplings on gas appliances, and/or the bolting of homes to their foundations and strengthening of cripple walls to reduce fire ignitions due to earthquakes.
2) Work with the State Fire Marshal, the California Seismic Safety, the Pacific Earthquake Engineering Research Center (PEER), and other experts to identify and manage gas-related fire risks of soft-story residential or mixed use buildings that are prone to collapse and occupant entrapment consistent with the natural gas safety recommendations of Seismic Safety Commission Report SSC-02-03. **Note** - Any values that are installed may need to have both excess flow and seismic triggers (hybrid valves). See http://www.seismic.ca.gov/pub/CSSC_2002-03_Natural%20Gas%20Safety.pdf.



CREDITS – This pamphlet was prepared by J. Perkins, Earthquake and Hazards Program Manager, Association of Bay Area Governments (ABAG), using funding, in part, from FEMA for the development of the Bay Area Local Hazard Mitigation Plan. Photos and diagrams – CDF–page 1, Office of the State Fire Marshal–page 2 top, FireSafe.org–page 2 bottom; Oakland Wildfire Prevention Assessment District – page 3, U.S. Geological Survey – page 4.